

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Gallatin National Forest

REPLY TO: 7460 Solid Waste

JUL 25 1979

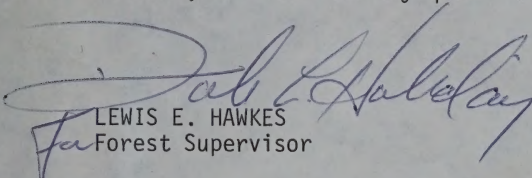
SUBJECT: West Yellowstone Landfill



TO: William Potts
Solid Waste Bureau
Montana Department of Health and Environmental Sciences
Helena, Montana 59601

Enclosed is one copy of a brief report on the evaluation of potential landfill sites near West Yellowstone, Montana. A suitable landfill site was not found in the Hebgen Lake Basin.

Please contact Harry Kringler, in the Forest Supervisor's Office in Bozeman, if there are any questions.


LEWIS E. HAWKES
Forest Supervisor

Enclosure

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MONTANA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES
SOLID WASTE SECTION

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MONTANA DEPARTMENT OF HEALTH
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BIOLOGICAL SECTION

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
REGION ONE

EVALUATION OF POTENTIAL LANDFILL SITES
NEAR WEST YELLOWSTONE, MONTANA

Compiled By

Harry Kringler
East Zone Environmental Engineer
Northern Region

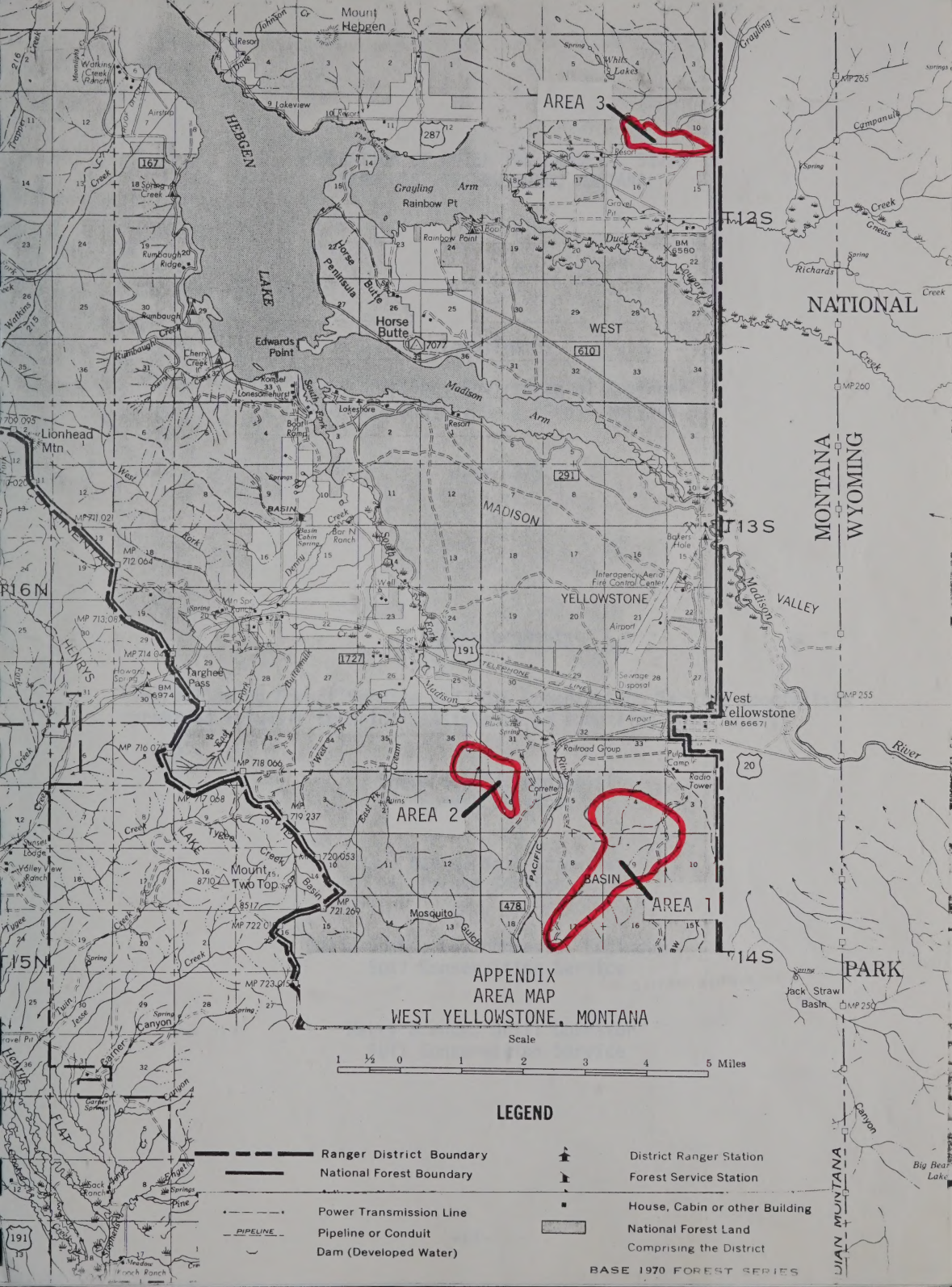


Engineering--



*for better public health
and a cleaner environment*



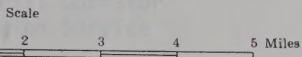


AREA 3

AREA 2

AREA 1

APPENDIX
AREA MAP
WEST YELLOWSTONE, MONTANA



LEGEND

- Ranger District Boundary
- National Forest Boundary
- Power Transmission Line
- PIPELINE
- Dam (Developed Water)
- District Ranger Station
- Forest Service Station
- House, Cabin or other Building
- National Forest Land Comprising the District

BASE 1970 FOREST SERIES

EVALUATION OF POTENTIAL LANDFILL SITES
NEAR WEST YELLOWSTONE, MONTANA

Compiled By

Harry Kringler, Environmental Engineer
Northern Region, U.S. Forest Service

July 1979

Acknowledgments

The following Forest Service and Soil Conservation Service specialists provided valuable technical assistance in compiling this report:

Sherm Sollid, Geologist
Forest Service

Carl Davis, Soil Scientist
Forest Service

David Jones, Environmental Engineer
Soil Conservation Service

Harry Brence, Drill Operator
Soil Conservation Service

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I. SUMMARY

Forest Service and Soil Conservation Service specialists participated in a field review of potential landfill sites near West Yellowstone, Montana. The field review consisted of test drilling potential landfill sites based on data compiled from geologic maps, contour maps, and specialist input based on past field experience in the area.

The majority of the land area in the Madison River Valley above Hebgen Lake is underlain by deep obsidian sand deposits or other permeable gravel or alluvium material. Other areas along the Madison River, South Fork Madison River, and upstream from the Grayling Arm of Hebgen Lake have shallow water tables. Only one area, located approximately one mile southwest of West Yellowstone, appeared to warrant field review. The area is identified on the attached map as Area 1.

Drilling indicated that there is approximately 15 feet of glacial till overlying bedrock in Area 1. The till would make fair cover material for a landfill because the compacted material would be moderately impervious to water.

The underlying bedrock is fractured and jointed, making it relatively permeable because water can flow through the cracks. This is not desirable under a sanitary landfill.

In theory, it would be possible to operate in Area 1 by excavating shallow trenches approximately ten feet deep. The trenches could be lined and covered with several feet of suitable till to reduce the percolation of groundwater down through the refuse. This method of operation would probably require disturbing two to four acres of land for one acre of landfill.

Area 1 is not recommended for a landfill site because of the following:

1. Shallow glacial till is underlain by permeable fractured bedrock.
2. Technically, it may be possible to operate a landfill in the area, but the economics are likely to make this alternative much more expensive than transporting the refuse to another landfill outside the Hebgen Lake Basin.

Another small area near the Duck Creek "Y" was reviewed at a later date by a Forest Service geologist. The area is identified as Area 3 on the attached map. The drill rig was not available to drill this site.

Area 3 is glacial till that is underlain by lava flows similar to that under Area 1. Depth of the till is not known at this time.

Other factors to consider for Area 3 are as follows:

1. Area includes the town cemetery site.
2. Approximately half of the land that is mapped as glacial till is privately owned.
3. The Forest Service wildlife biologist stated that the area is frequented by grizzly bears, and he would be against establishing a landfill in the area.
4. The area is approximately ten miles from West Yellowstone.

It is likely that Area 3 is not available or suitable for a landfill site based on the above factors.

Based on the field review and published information, a suitable landfill site does not appear to be available in the Hebgen Lake Basin. This does not preclude the possibility that a suitable site may exist due to localized geological conditions that are not reflected on the geological mapping of the area. Extensive field work and drilling would be required to prove or disprove this statement without any guarantee of success.

II. PROJECT HISTORY

On February 14, 1979, a meeting was held at the Hebgen Lake Ranger Station in West Yellowstone, Montana, concerning the groundwater contamination occurring near the West Yellowstone landfill. The meeting was attended by the following persons:

	<u>Agency</u>
Ralph Meyer	U.S. Forest Service
Jim Pennington	Yellowstone National Park
Ben Clary	Yellowstone National Park
Fred Shewman	Montana Water Quality Bureau
Duane Robertson	Montana Solid Waste Bureau
Ken Alkema	EPA (Helena)
Larry Binfet	Mayor, West Yellowstone
John Buttelman	Gallatin County Commissioner
Erick Armstrong	County Sanitarian
Elizabeth Loden	Bozeman Daily Chronicle
Barry Damschen	Robert Peccia and Associates

The main objective of the meeting was to review the conclusions in the Forest Service engineering report on groundwater quality near the landfill and determine if the landfill was in compliance with current regu-

lations. Based on State and EPA input, the group generally agreed that the operation of the existing landfill site would have to be modified or find a new disposal site. Based on preliminary cost data, the group agreed that the most economical alternative would be to find a suitable landfill site near West Yellowstone. Barry Damschen, Robert Peccia and Associates, said that a landfill site within six miles of West Yellowstone would probably be more economical than a transfer station.

Almost all of the land available for review as a landfill site was National Forest land. District Ranger Ralph Meyer said that the Forest Service would try to help as much as possible in locating and evaluating suitable landfill sites.

Forest Service specialists reviewed geologic maps and contour maps to locate possible landfill sites. Basic criteria used to select sites was as follows:

1. Soil and geological properties of the area (i.e., depth to bedrock, permeability, etc.).
2. Depth to highest water table.
3. Within six miles of West Yellowstone.

Two areas that appeared to be suitable for landfill sites were selected. The areas are identified as Area 1 and Area 2 on the attached map. Both areas were thought to have deep glacial tills and groundwater tables deeper than 50 feet. Area 2 was ultimately eliminated because of its close proximity to Black Sands Spring.

Forest Service and Soil Conservation Service specialists cooperated on a field review of Area 1 in late June, 1979. Eight test holes were drilled in the area. Four test holes had second holes drilled 15 to 20 feet away from the original holes to indicate if hard layers encountered during drilling were bedrock or large boulders. Logs of the test holes are attached for information.

Drilling indicated that there is an average of 15 feet of glacial till overlying bedrock. The till is mixed with zones of clayey gravel, silty gravel, and sandy gravel. There is enough clay content that the till would make fair cover material for a landfill. Compacted, the material would be moderately impervious to water.

The underlying bedrock consists of volcanic flows comprised of basalts, rhyolites, andesites, and welded tuffs. When these flows were extruded on the surface, they were hot viscous masses that covered large areas. As they cooled, they typically became fractured and jointed, making them relatively permeable. The sequence of volcanic rocks is over 1,500 feet

thick. The South Madison River has cut down through the till, exposing the underlying volcanic rocks along its banks.

It is likely that the shallow glacial till underlain with fractured bedrock would not be suitable for a sanitary landfill. Precipitation could percolate through the buried refuse and enter the groundwater through the fractures or joints.

It is technically possible to operate a landfill in Area 1 by excavating shallow trenches. The trenches could be lined and covered with several feet of suitable till to reduce the volume of water percolating down through the refuse. It is likely that two to four acres would have to be disturbed for every acre of landfill. Additional equipment such as a scraper and compaction equipment would be required compared to the existing landfill operation.

Barry Damschen, Robert Peccia and Associates, was notified on June 28, 1979 that there did not appear to be a suitable landfill site within six miles of West Yellowstone. He suggested that a site within ten miles of West Yellowstone would still be economically feasible.

The geological map of the entire Hebgen Lake Basin was reviewed for potential landfill sites with the restriction of looking primarily at Forest Service lands. Most of the privately owned lands are in the permeable obsidian sand flats or in areas of suspected high groundwater tables.

One small site, approximately one mile north of the Duck Creek "Y", was identified as a potential landfill site. The site is known locally as Fir Ridge and is shown as Area 3 on the attached map. The area includes the new West Yellowstone cemetery site located east of U.S. Highway 191. Prospective landfill sites probably would have to be located west of the highway.

The geologist from the Gallatin National Forest made a one-day field review of Area 3 that did not include the drilling of any test holes. The overburden is glacial till that is known to contain some fines, including clays. The underlying bedrock was formed from lava flows similar to the bedrock in Area 1. The bedrock is probably fractured and jointed, making it relatively permeable. The thickness of the glacial till is not known at this time.

There are other factors to be considered for Area 3 as a landfill site besides geology. The area is ten miles from West Yellowstone, so there would be ten miles of litter that would have to periodically be removed.

The lower half of Area 3 is privately owned and subdivided. Any contamination of the groundwater with leachate from a landfill could

pollute potable water wells that may be drilled to serve individual homes in the subdivision.

Grizzly bears are known to move through the area on a regular basis and it has been a trapping area for bears for a number of years. The Gallatin National Forest wildlife biologist said that a landfill would tend to attract bears to the area, which is close to the subdivided lands. It is likely that the frequency of grizzly bear-man encounters would increase, causing possible injury or death to man or disposal of the bear. Tentatively, the Greater Yellowstone Grizzly Bear Management Guideline policy indicates a "phase out" of sanitary landfills.

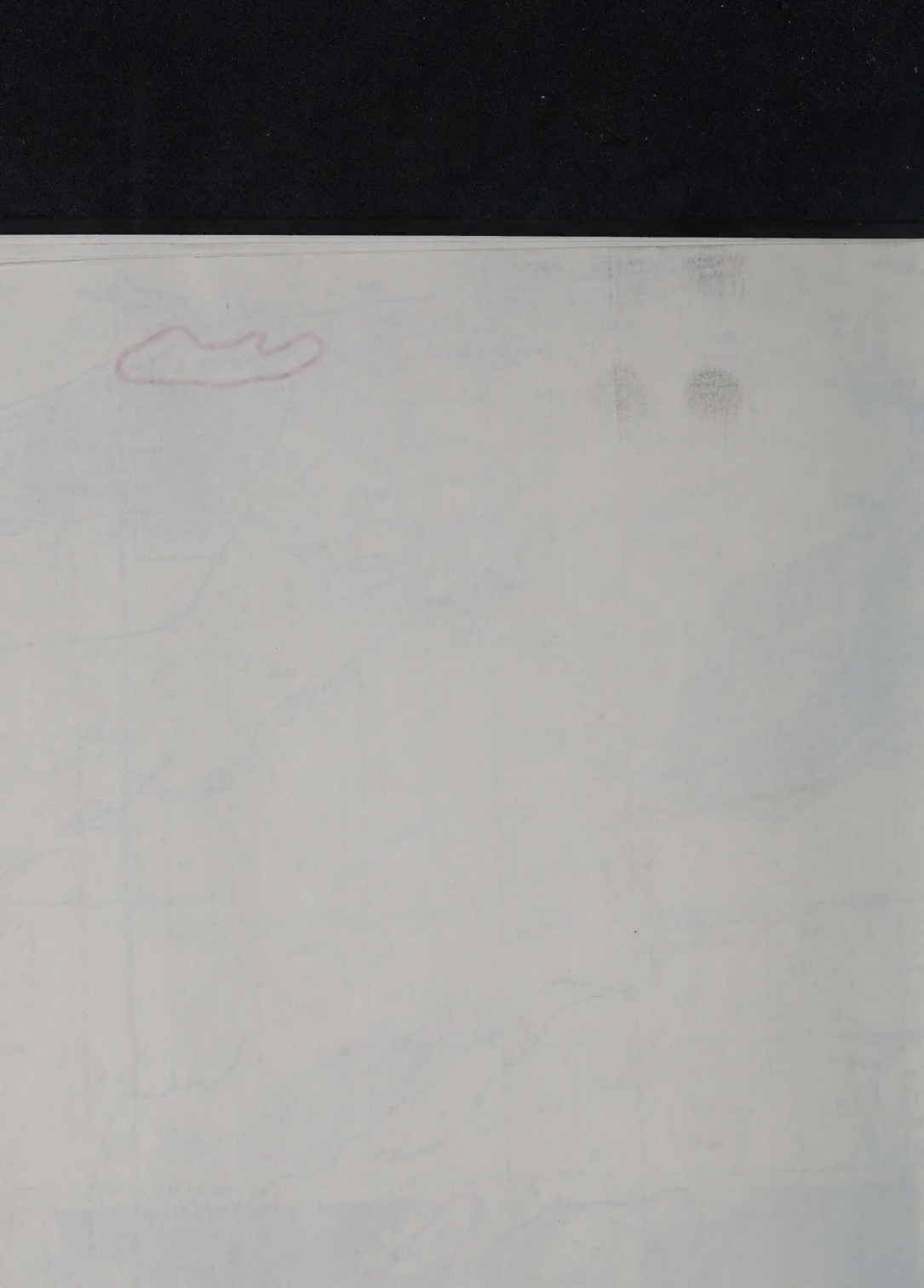
The new cemetery site is located in Area 3. A buffer strip would be needed to maintain the esthetic quality of the area surrounding the cemetery.

Based on the above factors, it is recommended that Area 3 should not be considered suitable for a landfill site.

To date, a suitable landfill site has not been found in the Hebgen Lake Basin.

APPENDIX





SHEET OF SHEETS

LOG OF TEST HOLES

SCS-533
REV. 3-67

LOCATION West Yellowstone land-fill Reem SUB-WATERSHED _____ SITE NO. _____
LOGGED BY Davis - Solid OWNER _____ STATE _____
DRILLING EQUIPMENT SCS Mobile Drill PROJECT: WP-07 WP-08 _____ FP-03 _____ P.L.-45 _____
LOCATION OF HOLES _____

HOLE NO.	STA. & SURFACE ELEVATION	HOLE DEPTH		DESCRIPTION OF MATERIALS	N	U S C S	TYPE BIT USED	NO.	SAMPLES			3 REC. %
		FROM FT.	TO FT.						1 TYPE	FROM FT.	TO FT.	2 CSE. REM. % MIN. DIAM.
7-02A	0	2		very fine sand		SM						
	2	6		gravelly loam cobbly		GC						
	6	10		gravelly loam no cobbles		GC						
	10	13		fine gravelly cobbly 10% clay		GM						
	13	15		very bouldery gravelly loam								
		15		This site is 150 yds uphill from		K						
				7-01A-B and 9-10 vertical feet								
				above 7-01 A-B								
7-03A	0	3		fine sand		SM						
	3	5		gravelly loam cobbly		GC						
	5	6		gravelly no cobbles		GC						
	6	9		gravelly loam cobbly mix with layers of fine sands		GC						
	9	13		fine sands		SM						
	13	19		fine gravelly no cobbles		GC						

LOG OF TEST HOLES

LOCATION <i>West Yellowstone Landfill Recon</i>		SUB-WATERSHED		SITE NO.	
LOGGED BY <i>Davis - Solid</i>		OWNER		STATE	
DATE <i>6/26/79</i>		PROJECT: WP-07		WP-08	
DRILLING EQUIPMENT <i>SCS Mobile Drill</i>		LOCATION OF HOLES		FP-03	
				PL-46	

HOLE NO.	STA. & SURFACE ELEVATION	HOLE DEPTH		DESCRIPTION OF MATERIALS	N	U		TYPE BIT USED	SAMPLES			3 REC.
		FROM FT.	TO FT.			S	C		1 NO. TYPE	FROM FT.	TO FT.	2 CSE. REM. MIN. DIAM. %
704A		0	2	gravelly fine sand/silt mix		GM						
				gravelly loam cobbly 10% clay		GM						
				gravelly loam cobbly 15% clay		GC						
				hit hard rock at 8		K						
704B		0	4	gravelly fine sand no cobbles		GM						
				gravelly loam cobbly 15% clay		GC						
				gravelly loam " 10 clay		GM						
				hit rock at 11		K						
705A		0	5	fine sand & silt mix		SM						
				gravelly loam no cobbles 15% clay		GC						
				gravelly loam cobbly		GC						
				bedrock		K						

APPENDIX

WATERSHED

SITE NO.

West yellowstone been handled

STATE

DATE 6/26/79

FP-03

P.L.-46

SES Mobile Drill

LOCATION OF HOLES

SAMPLES

APPENDIX

LOG OF TEST HOLES

SCS-593
REV. 3-67

LOCATION	West Yellowstone Landfill Recon		SUBWATERSHED	SITE NO.
LOGGED BY	Davis - 5/11/8	DATE	6/20/79	OWNER
DRILLING EQUIPMENT	SCS Mobile Dr-11	PROJECT:	WP-07	WP-08
		LOCATION OF HOLES	FP-03	PL-46

HOLE NO.	STA. & SURFACE ELEVATION	HOLE DEPTH		DESCRIPTION OF MATERIALS	N	U		TYPE BIT USED	NO.	1 TYPE	FROM		TO		CSE. REM.		2 MIN. DIAM.	3 REC.
		FT.	FT.			S	C				FT.	FT.	%	%				
706		0	4	fine sand w/ no cobbles		SM												
		4	12	gravelly loam cobbly 10% clay		GM												
		12		hard rock siltstone		K												
707		0	4	fine sand w/ no cobbles		SM												
		4	15	gravelly loam cobbly 10% clay		GM												
		16	23	basalt / rock		K												
708A		0	4	fine sand mix		SM												
		4	7	gravelly loam cobbly 10%		GM												
		7	12	gravelly loam cobbly 15%		GC												
		12	14	gravelly loam cobbly 10%		GM												
		14		basalt		K												

APPENDIX

LOG OF TEST HOLES

WATERSHED

SUB-WATERSHED

SITE NO.

LOCATION

west Yellowstone Landfill Recon

OWNER

STATE

LOGGED BY Davis - Solid

Davis-Solid	DATE
-------------	------

DATE 6/20/79

PROJECT:

WP-07

FP-03

P.L.-46

DRILLING EQUIPMENT

SCS Mobile Drill

LOCATION OF HOLES

[illegible]

